

Application. No. 10/091,624
Amendment dated June 18, 2004
Reply to Office Action of May 14, 2004

REMARKS/ARGUMENTS

Applicants first wish to thank Examiner Crepeau for his indication of allowable subject matter. Reconsideration of the above-identified application is respectfully requested in view of the foregoing amendments and the following remarks. Claims 1 and 9 have been amended. Claims 1 - 14 remain in the case.

The claims of the instant application are drawn to a direct secondary oxidation fuel cell which is capable of directly oxidizing a variety of alcohol fuels in the absence of an acid.

Claims 1 - 5, 8, and 10 - 13 were rejected under 35 U.S.C. §102(b) as being anticipated by United States Patent No. 6,492,047 for FUEL CELL WITH PROTON CONDUCTING MEMBRANE, issued December 10, 2002 to Emanuel Peled et al. PELED et al. teach a fuel cell capable of directly oxidizing alcohol fuels (e.g., methanol, glycerol, ethanol, isopropyl alcohol, etc.) but which utilize an acid in the proton conducting membrane or the fuel mixture. "The proton conducting membrane used in the fuel cell of the invention also comprises an acid" PELED et al. column 2, lines 56 - 57. PELED et al. also state:

"A large variety of low vapor pressure acids that are compatible with the cell hardware and with the catalysts at both electrodes can be used and adapted to a specific application. The following list of acids is given for example: polyfluoroolefin sulfonic acid, perfluoroolefin sulfonic acid, polyfluoroaryl sulfonic acids such as polyfluorobenzene, polyfluorotoluene, or polyfluorostyrene sulfonic acid, perfluoroaryl sulfonic acids such as perfluorobenzene, perfluorotoluene or perfluorostyrene sulfonic acid, similar acids where up to 50% of the hydrogen or fluorine atoms were replaced by chlorine atoms, $\text{CF}_3 (\text{CF}_2)_n \text{SO}_3 \text{H}$, $\text{HO}_3 \text{S}(\text{CF}_2 \text{CH}_2)_n \text{SO}_3 \text{H}$, $\text{CF}_3 (\text{CF}_2 \text{CH}_2)_n \text{SO}_3 \text{H}$, $\text{HO}_3 \text{S}(\text{CF}_2)_n \text{SO}_3 \text{H}$ where n is an integer having a value of 1 to 9, Nafion[™] ionomers, HCl, HBr, phosphoric acid, sulfuric acid and mixtures thereof HCl and HBr are

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not recommended for use in combination with noble metal catalysts like Pt." (Column 2, line 66 through column 3, line 14)

In contradistinction, Applicants' fuel cell avoids the use of an acid in either the membrane or the fuel for at least the reasons discussed in the BACKGROUND OF THE INVENTION of the instant application. Applicants' test fixture uses a Nafion™ 112 membrane having hot pressed layers of Toray paper loaded with Pt/Ru and Pt/carbon black (i.e., "blacks") as anode and cathode catalysts, respectively. Alcohol mixed with water is pumped into the cell and is then recalculated into a mixing tank. Compressed air is used as an oxygen source. No acid is present in the Nafion membrane nor in the catalyst layers. Neither is any acid added to the alcohol/water fuel mixture.

Claim 1 has been amended to recite "producing electrical current through the oxidation of a fuel containing a secondary alcohol and absent an acid in both said membrane elements and said fuel." Applicants believe that this amendment overcomes the rejection of claim 1 as being anticipated by PELED et al. Likewise, the rejections of claims 2 - 5, 8, and 10 - 13 depending from claim 1, are now overcome.

Claim 6 was rejected under 35 U.S.C. §103(a) as being unpatentable over PELED et al. in view of United States Patent No. 6,383,670 for SYSTEM AND METHOD FOR CONTROLLING THE OPERATION OF A FUEL PROCESSING SYSTEM, issued May 7, 2002 to David J. Edlund et al. The Examiner has relied upon EDLUND et al. only to support the use of propylene glycol as a fuel in Applicants' fuel cell. However EDLUND et al. neither teach nor suggest the use of an acid as part of a membrane, catalyst, or mixed with the alcohol in the fuel. Consequently, the amendment of claim 1 also overcomes the rejection of claim 6 under 35 U.S.C. §103(a) as being unpatentable over PELED et al. in view of EDLUND et al.

The Examiner suggested amending claim 9 to eliminate the term "such as". Claim 9 has been amended to eliminate the offending language.

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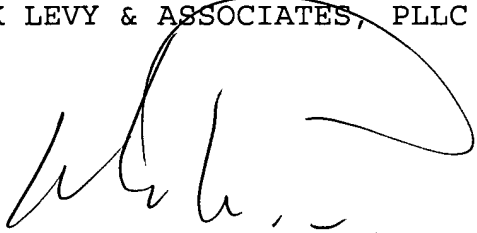
Examiner Crepeau indicated that claims 7 and 9 contained allowable subject matter. As both claims 7 and 9 depend from now allowable, claim 1, they also are believed to be allowable.

Applicants respectfully request that claims 1 - 14 be allowed and the application passed to issue.

Respectfully submitted,
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